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10/776,476	02/10/2004	Wayne A. Loeb	MP0351	4057

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EXAMINER	
JACKSON, BLANE J	

ART UNIT	PAPER NUMBER
2618	

DATE MAILED: 11/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/776,476	LOEB ET AL.	
	Examiner	Art Unit	
	Blane J. Jackson	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 January 1980*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-80* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *2-5,9-12,19-22,24,26,27,41 and 45* is/are allowed.

6)☐ Claim(s) *1,6-8,13-18,23,25,28-40,42-44,46-69 and 73-79* is/are rejected.

7)☒ Claim(s) *70-72 and 80* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments, see Remarks, filed 28 July 2006, with respect to the rejection(s) of claim(s) 1, 18 and 65 under Brandt and Klaren have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Brandt and Klaren in combination with Yamaguchi.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 6-8, 13-18, 23, 25, 28-36, 65, 73-75, 77 and 78 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brandt (US 6,538,515) in view of Klaren et al. (US 2004/0095190) and Yamaguchi (US 6,804,500).

As to claims 1, 18 and 65, Brandt teaches a method and apparatus for an adjustable segmented amplifier comprising:

An adjustable stage comprising a plurality of independently selectable parallel amplifier segments (figures 2 and 4, column 2, line 63 to column 3, line 8, two, three or more coupled parallel amplifiers to comprise a power amplifier),

Each of said parallel amplifier segments having an input at said first common node and an output at a second common node wherein each of said parallel amplifier segments comprises a transistor having a control terminal and a first *resistor* in electrical communication with said control terminal of said transistor (figures 2 and 4, common input node is the RF input and the common output node is RF Load (130), FET transistors (302, 102 and 104) are each gate controlled via individual series resistors to DC bias control),

Wherein said adjustable stage is configured to provide an output signal in one of a plurality of power ranges corresponding to a number of selected parallel amplifier segments (column 2, line 63 to column 3, line 14),

Said output signal having minimum power efficiency when two or more of said parallel amplifier segments are selected (column 3, lines 14-33).

Brandt teaches a power amplifier with a plurality of parallel adjustable stages but is silent as to a first fixed (gain) stage configured to amplify an analog signal and provide a first amplified output at a first common node.

Klaren teaches a power amplifier (figure 1) comprising two parallel amplifiers (38 and 40) that are preceded by an amplifier driver stage (22) where both the driver and power amplifiers are under bias control for gain control, paragraphs 0040-0045. Klaren, though primarily focused on methods to bypass the PA package, also demonstrates a fixed driver amplifier (132) to amplify an analog signal and provide a first amplified output at a common node, the node represented by the band pass filter (134) prior to signal splitting at the quadrature hybrid (152), figure 7, paragraphs 0008 and 0015.

Since Klaren teaches an amplifier driver, band pass filter and hybrid as known components to precede the actual parallel power amplifiers of a power amplifier package, it would have been obvious to one of ordinary skill in the art at the time of the invention to realize in the power amplifier package of Brandt the additional components of Klaren to meet design signal levels through the power amplifier package.

Brandt modified teaches each of said parallel amplifiers segments comprises a control terminal with a first inductor in electrical communication with said control terminal of said transistor but does not teach a first inductor in electrical communication with said control terminal of said transistor.

Yamaguchi teaches a parallel high output amplifier cell block in parallel with a controlled low output amplifier cell block wherein each of the parallel amplifier segments comprises a transistor having a control terminal and a resistor in series with a first inductor (figure 14, choke inductors (L1H) of the first transistor amplifier cell block (1a) and choke inductor (L1L) of the second transistor amplifier cell block (1b)) in electrical communication with said control terminal of each transistor, column 4, lines 24-41 and column 11, lines 34-57.

It would have been obvious to one of ordinary skill in the art at the time of the invention to augment Brandt modified with a choke inductor in series with the FET gate resistor to block input frequencies from coupling into the biasing circuits.

As to claim 6, Brandt teaches the adjustable amplifier of claim 1 wherein at lest one of said plurality of parallel amplifier segments are selected for operation (figures 2 and 4, column 3, lines 14-23).

As to claim 7, Brandt teaches the adjustable amplifier of claim 6 wherein said at lest one selected parallel amplifier segment is selected for operation be applying a non-zero bias at a control terminal (figure 4, the transistors (304, 106 and 108), bipolar or FETs, would require a non zero bias for operation, column 2, lines 37-54).

As to claim 8, Brandt teaches the adjustable amplifier of claim 7 further comprising a bias generator configured to apply a bias to said control terminal (figures 1-4, various concepts for bias control requiring a generator).

As to claim 13, Brandt teaches the adjustable amplifier of claim 1 wherein an efficiency of said high-efficiency output power range is at least 50% of a maximum efficiency of said adjustable amplifier (figure 4, column 2, line 66 to column 3, line 33, one or some combination of a plurality of power transistors are disconnected from the power supply and re-biased via the DC Bias control).

As to claim 14, Brandt teaches the adjustable amplifier of claim 1 wherein the efficiency is at least 60% of said maximum efficiency (figure 4, column 2, line 66 to

column 3, line 33, one or some combination of a plurality of power transistors are turned off disconnecting a transistor from the power supply).

As to claim 15, Brandt modified teaches the adjustable amplifier of claim 1 wherein said fixed stage comprises a first bipolar transistor and each of said plurality of parallel amplifier segments comprises a second bipolar transistor (Brandt: figure 4, column 2, lines 37-44, the parallel transistors are FETs or bipolar, likewise consideration for the driver amplifier (22) as taught by Klaren: paragraph 0045).

As to claim 16, Brandt teaches the adjustable amplifier of claim 15 further comprising:

A second inductor in electrical communication between said first bipolar transistor and a first electric potential, and

A first inductor is in electrical communication between each of said second bipolar transistors and said first electric potential (figure 4, an individual RF choke in series with the switched power supply and each respective transistor).

As to claims 17 and 77, Brandt teaches the adjustable amplifier of claim 1 wherein each of said plurality of parallel amplifier segments has substantially the same size, design, gain function, output power and power efficiency characteristics as the others of said plurality of parallel amplifier segments (figure 4, column 2, lines 37-45 matched FETs or BJTs and any transistor with low "on" resistance is suitable).

As to claim 23, Klaren of Brandt modified teaches the circuit of claim 18 wherein each of said means for further amplifying further comprises a means for filtering said first amplified signal in electrical communication with said first common node and said control terminal of said transistor (figures 6 and 7, paragraph 0008, a band pass filter (134) in series between the driver amplifier (132) and subsequent power transistor package).

As to claim 25, Brandt teaches the circuit of claim 18 further comprising a means for providing said bias signal (figure 2, Bias High or DC Bias Normal denotes circuits to generate bias control).

As to claim 28, Brandt teaches the circuit of claim 19 wherein at least one of said plurality of means for further amplifying is selected for operation (column 3, lines 14-33).

As to claim 29, Brandt teaches the circuit of claim 18 wherein said means for amplifying comprises a first bipolar transistor and each of said means for further amplifying comprises a second bipolar transistor (figure 2, column 2, lines 37-44, bipolar junction or FET transistors).

As to claim 30, Brandt teaches the circuit of claim 29 further comprising:

A first means for coupling an output matching network to an output of said means for amplifying (figures 2 and 5, column 3, lines 14-37, the output impedance of each power transistor is considered whether biased on or off in relation to each series output inductor and shunt capacitor (118) to efficiently match the RF load (130). Note the emphasis of the Brandt patent is concerned with impedance matching the power amplifier to the output load with different selected output power, however, as the subject matter in previous claims, power control is also being accomplished with the disconnection and bias control of each power transistor).

As to claims 31 and 78, Brandt teaches the adjustable amplifier of claim 18 wherein each of said means for further amplifying has one or more substantially identical characteristics as the others of said means for further amplifying (figure 4, column 2, lines 37-45 matched FETs or BJTs and any transistor with low "on" resistance is suitable).

As to claims 32 and 35, Brandt teaches an integrated circuit of claim 1 comprising an adjustable amplifier and a transmitter or transceiver communicatively coupled to said adjustable amplifier, said transmitter being configure to transmit said analog signal to said adjustable amplifier (column 1, lines 14-28, an adjustable power amplifier for application in cellular systems).

As to claim 33, Brandt teaches the integrated circuit of claim 32 wherein said analog signal has a frequency *of at least about 800 MHz* (column 1, lines 14-24, application of the power amplifier to transmitters used in GSM like systems).

As to claims 34 and 36, Brandt modified teaches the integrated circuit of claim 32 wherein said analog signal has a frequency *of GSM systems* but is silent as to *at least about 2.4 GHz* or the transceiver is compliant with a standard selected from IEEEE 802.11 and 802.16. However Brandt teaches the power amplifier is applicable to GSM like systems (column 1, lines 10-24) therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to recognize that Brandt's general intention of application of the power amplifier to a wireless system includes any other specific public and private cellular systems as well as LAN networks.

As to claim 73, Brandt teaches the method of claim 65 further comprising the step of matching a frequency of said output signal to an input of each of said parallel amplifier segments (figure 1, column 2, lines 37-54, capacitive input to each stage).

As to claim 74, Brandt teaches the method of claim 65 further comprising the step of broadcasting said output signal (column 1, lines 14-24, an efficient PA applied to the GSM cellular system).

As to claim 75, Brandt teaches the method of claim 65 wherein said output signal has a minimum frequency of about 800 MHz (column 1, lines 14-32, GSM system operates in a 900 MHz band).

Claims 37- 40, 42, 47-64, 66-69 and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brandt (US 6,538,515), Klaren et al. (US 2004/0095190) and Yamaguchi (US 6,804,500) in view of Khorram (US 6,996,379).

As to claims 37 and 42, Brandt teaches a system for broadcasting an analog signal of the integrated circuit of claim 32 (figure 2) but does not teach a signal converter configured to provide a converted analog output signal from said output signal of said adjustable amplifier and a transmission antenna configured to broadcast said converted analog output signal.

Khorram teaches a linear high powered integrated circuit transmitter for application to wireless communication systems comprising a plurality of differential transconductance power amplifiers in parallel with a common output node coupled to a signal converter or balun (150) via a current to voltage circuit (144) to convert the differential output signal to a single ended RF signal to further couple to an antenna (86), figure 2 and 5, column 7, line 60 to column 8, line 26).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Brandt modified with the power amplifier of Khorram for a balanced transmitter system for wireless communication systems.

As to claim 38, Khorram of Brandt teaches the system of claim 37 wherein said signal converter comprises a transformer (figure 5, balun 150), column 8, lines 23-26).

As to claim 39, Khorram of Brandt modified teaches the system of claim 37 further comprising an output capacitor coupled to said second common node (figure 5, column 8, lines 18-27, current to voltage circuit (144)).

As to claim 40, Khorram of Brandt modified teaches the system of claim 37 further comprising an output inductor coupled to said second common node (figure 5, column 8, lines 18-27, current to voltage circuit (144)).

As to claim 47, Khorram of Brandt modified teaches a network comprising the system of claim 37 and a receiver in electromagnetic communication with said system (figure 1, column 3, lines 51-60, wireless communication system and figure 2, column 4, lines 17-61, radio (60)).

As to claim 48, Khorram of Brandt modified teaches the network of claim 47 further comprising a receiving antenna in communication with said receiver (figure 2, antenna (86), column 4, lines 47-61).

As to claims 49-51, Khorram of Brandt modified directly teaches a network comprising a plurality of the systems of claim 37 and a plurality of receiver each of said

receivers being in communication with at least one of said systems (figure 1, column 3, lines 51-60).

As to claims 52 and 56, Khorram of Brandt modified teaches a system and an integrated circuit comprising the circuit of claim 37 and a means for transmitting said analog signal to said adjustable amplifier (figure 2, up-conversion module (82) coupled to PA (84)).

As to claim 53, Khorram of Brandt modified teaches the integrated circuit of claim 52 wherein said analog signal has a frequency of at least about 2.4 GHz (column 1, lines 11-31).

As to claim 54, Khorram of Brandt modified teaches a transceiver comprising the integrated circuit of claim 52 (figure 2).

As to claim 55, Khorram of Brandt modified teaches the transceiver of claim 54 wherein the transceiver is compliant with a stander selected from the group consisting of IEEE 802.11 and 802.16 (column 1, lines 11-31).

As to claim 57, Khorram of Brandt modified teaches the system of claim 56 wherein said means for providing comprises a pair of inductors in electromagnetic communication with each other (figure 5, balun 150)).

As to claim 58, Khorram of Brandt modified teaches the system of claim 56 wherein said output signal comprises a differential signal and said means for providing is configured to convert said differential signal to a single-ended signal (figure 5, column 8, lines 18-26, balun (150) converts the differential output to a singe-ended RF signal).

As to claim 59, Khorram of Brandt modified teaches a network comprising the system of claim 56 and a means for receiving said amplified analog output signal in communication with said system (figure 2, antenna (86) and the receiver portion of radio (60)).

As to claim 60, Khorram of Brandt modified teaches the network of claim 59 further comprising a means for processing said amplified analog output signal received by said means for receiving wherein said means for processing is in communication with said means for receiving (figure 2, antenna (86) and the receiver portion of radio (60)).

As to claim 61, Khorram of Brandt modified teaches a network comprising a plurality of the systems of claim 56 and a plurality of means for receiving said amplified analog output signal each of said means for receiving being in communication with at least one of said systems (figure 1, column 1, lines 11-31).

As to claims 62-64, Khorram of Brandt modified teaches the network of claim 61 further comprising a plurality of means for processing said amplified analog output signal received by said means for receiving wherein each of said means for processing is in communication with a unique one of said means for receiving (figure 1, a network including base stations, column 1, lines 26-47).

As to claim 66, Brandt teaches the method of claim 65 wherein said selecting step comprises applying a bias to those amplifier segments to be selected (figure 2, column 3, lines 14-33, a power amplifier is turned off and the transistor is biased to an on-state which makes transistor a low impedance to ground, opposite scenario to activate).

As to claim 67, Brandt teaches the method of claim 65 further comprising the step of generating said bias (figure 2, column 3, lines 14-33).

As to claim 68, Brandt teaches the method of claim 65 further comprising the step of generating the bias independently for each selected parallel amplifier segment (figure 2, column 3, lines 14-33).

As to claim 69, Brandt teaches the method of claim 65 wherein a value of said bias corresponds to said number of selected amplifier segments (column 3, lines 14-33).

As to claim 76 with respect to claim 65, Brandt teaches an adjustable power amplifier with application to the GSM wireless cellular networks but is silent as to compliant with a standard selected from the group consisting of IEE 801.11a-I and 802.16.

Khorram teaches an integrated power amplifier comprising a plurality of parallel differential amplifiers with application in devices used in wireless cellular network and a local area network, figure 1, column 3, line 50 to column 4, line 16.

It would have been obvious to one of ordinary skill in the art at the time of the invention to recognize the expansion of the application of the power amplifier of Brandt modified in the diverse networks of Khorram to meet operation efficiency requirements in all wireless networks.

Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brandt (US 6,538,515), Klaren et al. (US 2004/0095190) and Khorram (US 6,996,379) in view of Endou et al. (US 5,602,508).

As to claim 43 with respect to claim 42, Brandt modified is silent as to the differential output signal comprising first and second output capacitors.

Endou teaches a differential amplifier with input and output transformers ((10) and (11)) to convert the differential amplifier for single ended input and output, figure 1. Endou also illustrates first and second output capacitors ((19) and (20)) respectively coupled to each line of the differential output signal. It would have been obvious to one of ordinary skill in the art at the time of the invention to realize in the differential amplifier

of Brandt modified the output capacitors of Endou to block amplifier bias currents but to pass the frequency of interest from the amplifier to the coupling transformer.

Claims 44 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brandt (US 6,538,515), Klaren et al. (US 2004/0095190) and Khorram (US 6,996,379) in view of Davis (5,343,162).

As to claims 44 and 46 with respect to claim 42, Brandt modified is silent as to the differential output signal comprising first and second output inductors and a differential output capacitor respectively coupled to each line of the differential output signal.

Davis teaches a differential amplifier comprising first and second output inductors (17) and a differential output capacitor (16) coupled to each line of the differential output signal, figure 1, column 2, lines 8-48. Davis further teaches two alternative outputs, a direct coupling (out 1) or a transformer (18) forming a resonant circuit with capacitor (16) for differential or single ended inductive output coupling.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Brandt modified with the resonant output circuits of Davis such that the amplifier can maintain the Q of the tuned circuits in the output when saturated.

Claim 79 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brandt (US 6,538,515), Klaren et al. (US 2004/0095190) and Yamaguchi (US 6,804,500) in view of Masahiro (Us 2002/0005760.

Brandt teaches a power amplifier comprised of a plurality of parallel bipolar or FET transistors, each with bias control to control the contributing gain of each, figure 1, column 2, lines 37-66, but is silent as to each adjustable stage is further configured for class AAB operation.

Masahiro teaches a typical prior art variable gain amplifier circuit with inductively coupled bias control to the transistor base for gain control, inductively loaded collector output and the emitter grounded, figures 1 and 2, paragraphs 0012-0014. With reference to the graph of figure 2, an increase in bias current results in an increase in collector to emitter current with a corresponding increase in gain (and increase of the third intercept point). The range of selected bias current with respect to gain corresponds to the transistor operating at cutoff, class D, C, B, AB, A and saturation with increasing bias current drive, paragraphs 0015-0019.

It would have been obvious to one of ordinary skill in the art at the time of the invention to realize the bias control point of the power amplifier of Brandt of Brandt modified results in a corresponding class of operation as suggested by Masahiro to achieve the desired gain, third order intercept point and power consumption.

Allowable Subject Matter

Claims 2-5, 9-12, 19-22, 24, 26, 27, 41 and 45 are allowed.

Claims 70-72 and 80 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Blane J. Jackson whose telephone number is (571) 272-7890. The examiner can normally be reached on Monday through Friday, 8:30 AM-6:00 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on (571) 272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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